Title: Interannual variation in phytoplankton class-specific primary production at a global scale

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Popular Summary

Phytoplankton is responsible for over half of the net primary production on earth. The knowledge on the contribution of various phytoplankton groups to the total primary production is still poorly understood. Data from satellite observations suggest that for upwelling regions, photosynthetic rates by microplankton is higher than that of nanoplankton but that when the spatial extent is considered, the production by nanoplankton is comparable or even larger than microplankton. Here, we used the NASA Ocean Biogeochemical Model (NOBM) combined with remote sensing data via assimilation to evaluate the contribution of 4 phytoplankton groups to the total primary production. Globally, diatoms were the group that contributed the most to the total phytoplankton production (~50%) followed by coccolithophores and chlorophytes. Primary production by diatoms was highest in high latitude (>45°) and in major upwelling systems (Equatorial Pacific and Benguela system). We assessed the effects of climate variability on the class-specific primary production using global (i.e. Multivariate El Niño Index, MEI) and 'regional' climate indices (e.g. Southern Annular Mode (SAM), Pacific Decadal Oscillation (PDO) and North Atlantic Oscillation (NAO)). Most interannual variability occurred in the Equatorial Pacific and was associated with climate variability. These results provide a modeling and data assimilation perspective to phytoplankton partitioning of primary production and contribute to our understanding of the dynamics of the carbon cycle in the oceans at a global scale.